Photographing Television Images

AC-10

It's fun to take pictures of the images on your television screen. Television gives you the opportunity to see and photograph many important and enjoyable events right in your own home. Political conventions, the inauguration of the President, the Tournament of Roses Parade, the Olympics, and the Academy Awards presentations are just a few of the many shows on television that you may want to photograph. You can use either color or black-and-white film to take pictures of color or black-and-white television.

EQUIPMENT AND FILM REQUIREMENTS

For taking black-and-white pictures of television images, you can use many of the various cameras that are available. However, you'll get the best results with an automatic or adjustable camera. If you have a simple camera without exposure or distance settings, you must use a high-speed film, such as KODAK TRI-X Pan Film if this film is available in the size that your camera accepts. (See page 8.) To take color pictures, you should use a camera with an *f*/8 or faster lens, depending upon the film your camera accepts, and a shutter that you can set at 1/8 second or slower; 1/30 second or slower for cameras with leaf shutters. If you want to take movies, you'll need a movie camera with an *f*/2.8 or faster lens.

To determine the correct exposure, you can use an automatic camera or a reflected-light exposure meter. If you don't have either of these, you can set your camera according to the exposure table on page 7.

TV images are quite dim compared to average subjects in daylight. Therefore, to avoid using large lens openings and very slow shutter speeds, you may want to use a high-speed film such as KODACOLOR 400 Film for color prints,

You can easily photograph the picture on your television screen. KODAK EKTACHROME 200 Film (Daylight), 1/30 second *f*/2.8.

Kodak Ektachrome 400 Film (Daylight) or Kodak Ektachrome 200 Film (Daylight) for color slides, or Kodak Tri-X Pan Film for black-and-white prints. However, you can use medium-speed films like Kodachrome 64 Film (Daylight) or Kodak Ektachrome 64 Film (Daylight) for color slides, or Kodacolor II Film for color prints. See the exposure table on page 7. To prevent camera motion at shutter speeds slower than 1/30 second, mount your camera on a tripod or other firm support.

ADJUSTING YOUR TELEVISION SET

To obtain the best quality in your photographs, adjust your TV set so that the contrast of the television picture is slightly lower than normal. Adjust the brightness control so that both the highlight and shadow areas of the TV image show detail. The shadows should not be a light tone or completely black. Adjust the controls on a color set for a pleasing color picture on the screen.

Sometimes in order to get enough exposure, depending upon your camera and film, you may need to adjust your TV set for maximum brightness. When and how you should do this are explained in other sections of this pamphlet. Generally, you'll obtain the best quality in your pictures of television images when the TV set is adjusted normally as described above.

Some new color TV sets have an electric eye which automatically adjusts the brightness to the room lighting. To obtain proper exposure if your set has such a device, turn off the electric eye and adjust the brightness manually for a normal television image or for maximum brightness when needed.

Room Lighting

Watch out for reflections on the face of the television tube. To help eliminate reflections, turn off most or all of the room lights. Reducing the light in the room also helps make the area surrounding the TV image appear black in your photographs. A black area surrounding the TV image is usually more pleasing than a lighter area showing part of the room or the border around the picture tube.

Don't use flash or photolamp lighting to photograph television images. These light sources are much brighter than the TV image, and your pictures would show a blank television screen.

TAKING PICTURES

For best results, move in close to the television screen with your camera. If the minimum focusing distance for your camera will allow it, move in until the TV screen fills the picture area in your viewfinder. If your TV screen is small, you may want to use a close-up lens to get a larger image in your photographs. Your photo dealer can help you select a close-up lens and adapter ring to fit your particular camera. Eastman Kodak Company does not manufacture these items. Your dealer may be able to recommend suppliers if these items are not stocked or perhaps order them for you. Following are names and addresses of two distributors of a variety of lens attachments:

Spiratone, Inc., 130 West 31st Street, New York, New York 10001
Tiffen Optical Company, 90 Oser Avenue, Hauppauge, Long Island, New York 11787

If you have a single-lens reflex camera with through-the-lens viewing, you'll see exactly what you'll get in your close-up pictures when you look through the viewfinder. But if the viewfinder on your camera is separate from the lens, it may not show you exactly what will be included in the picture. To center the TV screen on your film with a camera of this type, tip the camera slightly in the direction of the viewfinder, or use the close-up framing device described below. See your camera manual for instructions on using your viewfinder.

CLOSE-UP LENS TABLE FOR STILL CAMERAS

This table applies to cameras with focusing lenses of normal focal length. See page 8 for information on simple cameras.

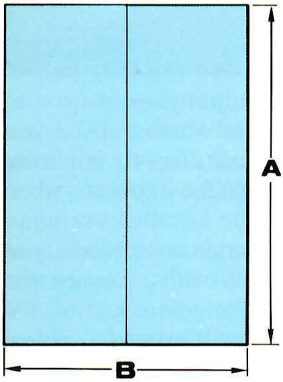
TV Screen Size— Picture Diagonal (inches)	Close-up Lens	Distance from Lens to TV Screen* (inches)	Set the Camera Focus Scale at (feet)
22–23–25	+1	39	Inf
20–21	+1	34¾	25
18–19	+1	32¼	15
14–15–16	+1	25½	6
11–12	+2	19½	Inf
9	+2	15½	6

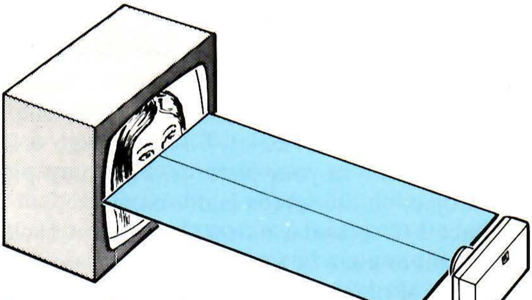
*Measure the distance from the front rim of the close-up lens to the TV screen.

If your camera can focus on subjects as close as 2 feet, you can photograph TV screens that have a *diagonal* picture size of 14 inches or larger and obtain a satisfactory image size without using a close-up lens. If the closest focus setting on your camera is 3 feet, you can photograph TV screens 18 inches in size or larger without a close-up lens.

Close-Up Framing Device

You can make a simple device that will both measure the distance from your camera lens to the TV screen and center the TV screen in your photographs. Consult the table above for the close-up lens to use, the lens-to-screen distance, and the camera focus setting for the size of your TV screen. For simple cameras, see page 8.





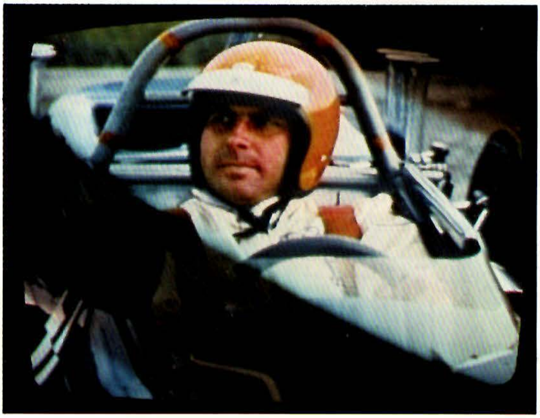
A **Lens-to-Screen Distance**
B **Width of TV Screen**

Cut a piece of cardboard and draw a line down the center as shown. To take the picture, hold the card straight out from your camera in front of the center of the close-up lens. Remember not to use the viewfinder to frame your picture unless you have a single-lens reflex camera. Line up the end of the card so that it just touches the TV screen and the width of the card coincides with the width of the screen. Drop the card and take the picture.

Shutter Speed

Television images are composed of 525 straight horizontal lines called scanning lines. The image is formed in your TV set by a moving electron beam which scans the picture in two sections. All the odd-numbered lines are traced in 1/60 second to produce an image. As soon as this cycle is completed, the picture is scanned again in 1/60 second, this time tracing the even-numbered lines. Therefore it takes 1/30 second to make a complete picture on the screen. That's why you must use a shutter speed of 1/30 second or slower to record at least one complete picture cycle. Otherwise you may get a dark band across your photograph.

If your camera has a focal-plane shutter, you should use a shutter speed of 1/8 second or slower to obtain uniform exposure. A slower shutter speed is required with a focal-plane shutter than with a leaf shutter because the motion of the focal-plane shutter across the film plane relative to the motion of the TV electron beam causes a dark band across your pictures at shutter speeds faster than 1/8 second. Kodak still cameras have leaf shutters.



If you use a shutter speed faster than 1/8 second with a focal-plane shutter, or faster than 1/30 second with a leaf shutter, you may get a dark band across your picture. This picture was taken at 1/125 second with a focal-plane shutter.

When you use shutter speeds slower than 1/30 second, put your camera on a tripod or other firm support, like a table. Use the fastest shutter speed you can up to 1/30 second—1/8 second with a focal-plane shutter—to minimize subject motion in your pictures. For sharp pictures, make the exposure when the subject on the screen is not moving.

Since 1/8 second is a slow shutter speed suitable for stationary subjects, you may want to use a faster shutter speed—up to 1/30 second—with a camera that has a focal-plane shutter to minimize subject motion. Pictures taken of TV images at 1/15 or 1/30 second using this type of shutter will have less subject motion but may show slight diagonal streaks from using a shutter speed that's too fast. These streaks may be acceptable to you when you want to use faster shutter speeds with a focal-plane shutter.

Color Pictures

Use daylight color film for photographing TV images. Color pictures of color television will have a somewhat blue-green appearance because the film's sensitivity to the TV picture is different from the eye's sensitivity. You can improve color rendition in your pictures by using a KODAK Color Compensating Filter, CC40R (gelatin), over your camera lens to help bring out the reds. The CC40R filter will absorb light, so increase exposure by 1 stop. You can order this filter from your photo dealer. The CC40R filter is not recommended for use with KODACOLOR 400 Film or with movie cameras.

Automatic Cameras

Fill the picture area in the viewfinder with the TV image so that the exposure meter in your camera "sees" only the TV screen. If your camera is too far away from the TV screen, the exposure meter sees too much of the dark area surrounding the TV image, resulting in overexposure on your film.

If the minimum camera-to-subject distance for your camera (without a close-up lens) won't let you get close enough to fill the viewfinder with the TV image, you may be able to make a close-up exposure-meter reading. With some automatic cameras you can maintain the exposure setting determined by the camera by partially depressing the shutter release and holding it in this position. This will let you set the exposure with your camera close to the TV screen. Continue to hold the shutter release partially depressed until you move the camera back to take the picture. Other cameras have a button or lever you push to hold the meter reading for making close-up readings. See your camera manual to determine whether you can use any of these techniques with your camera.

When you're taking pictures, the low-light indicator may appear in your camera viewfinder. Usually you can ignore this warning and take pictures anyway. You'll probably get satisfactory results, although your pictures may appear dark. By comparing the exposures suggested in the table on page 7 with the largest lens opening and slowest shutter speed marked on some automatic cameras or given in the camera manual, it's possible to determine whether the camera is capable of making properly exposed pictures.

Some automatic cameras determine the exposure by automatically selecting the shutter speed after you have selected the lens opening. To photograph TV images with this type of camera, focus the camera on the TV image. Adjust the lens opening until the shutter speed automatically adjusts to a speed of 1/30 second, 1/8 second with a focal-plane shutter, or slower. If the shutter speed is slower than 1/30 second, put your camera on a tripod or other firm support.

If you use the CC40R filter to improve color rendition, and if the built-in exposure meter in your camera makes the reading through the filter over the lens, the camera should automatically increase exposure to compensate for the filter. But if your automatic camera has an exposure meter separate from the lens, cut a small piece of the gelatin CC40R filter and tape it over the exposure meter. Then your camera should automatically adjust for proper exposure when you use the filter.

Except for the cameras listed in the following table, you should not attempt to use Kodak 110-size cameras to photograph color and black-and-white television images. The results would not be satisfactory. Since the cameras listed have fast lenses and—except for the Kodak Ektramax Camera—have automatic exposure controls, you can use these cameras to photograph both color and black-and-white TV images.

Adjust the TV picture as recommended in the table—normal brightness as described on page 2 or maximum brightness. To adjust your TV set for maximum brightness, turn up the brightness control on the TV set as much as possible without losing highlight detail. Also turn up the contrast control to restore the contrast of the TV image, but keep the contrast slightly lower than normal.

Do not use a flipflash, magicube, or electronic flash on the camera. Follow the recommendations for automatic cameras described at the beginning of this section.

Recommendations for Photographing Color and Black-and-White Television Images with the Kodak Ektramax Camera and Kodak Tele-Instamatic, Trimlite Instamatic, and Pocket Instamatic Cameras

	Adjustment for Television Brightness Control			
	Kodak Film			
Kodak Camera	Kodacolor 400 (Color Prints)	Kodacolor II (Color Prints)	Kodachrome 64 (Daylight) Ektachrome 64 (Daylight) (Color Slides)	Verichrome Pan (Black-and-White Prints)
Ektramax Use XL setting.	Normal Brightness	Maximum Brightness	Maximum Brightness	Normal Brightness
Trimlite Instamatic 48	Normal Brightness	Maximum Brightness	Maximum Brightness	Normal Brightness
Tele-Instamatic 708	Maximum Brightness	Not Recommended	Not Recommended	Maximum Brightness
Pocket Instamatic 50 Pocket Instamatic 60	Normal Brightness	Normal Brightness*	Normal Brightness*	Normal Brightness

*The use of the CC40R filter is recommended only for these camera-and-film combinations. The use of this filter is optional.

For Kodak Instamatic X-35F and X-35 Cameras, follow the general recommendations for automatic cameras and the film and TV-adjustment recommendations given for simple cameras on page 8.

Adjustable Cameras

If you have an adjustable camera with a built-in exposure meter, when you make the meter reading be sure the TV screen fills the picture area as recommended for automatic cameras. If your camera doesn't have a built-in meter, you can use a separate reflected-light exposure meter to determine the exposure. Hold the meter close to the TV screen so that it reads only the screen.

Position your meter to read approximately equal parts of light and dark areas of the TV picture. If you don't have an exposure meter, set your camera as suggested in the table below.

Some exposure meters may indicate incorrect exposure for photographing TV because of the way the meter reacts to the TV image. Compare the exposure indicated by your meter with the exposure suggested in the table below. If the exposure is much different, you should make some trial exposures with your camera to determine a correction factor for your exposure meter.

SUGGESTED CAMERA SETTINGS FOR PICTURES OF TELEVISION IMAGES

KODAK Film	**Use for**	**Color Television Set**		**Black-and-White Television Set**	
		Leaf Shutter	**Focal-Plane Shutter**	**Leaf Shutter**	**Focal-Plane Shutter**
VERICHROME Pan PLUS-X Pan	Black-and-White Prints	1/30 sec f/2.8	1/8 sec f/5.6	1/30 sec f/4	1/8 sec f/8
TRI-X Pan	Black-and-White Prints	1/30 sec f/4 ⌊↓⌋ 5.6	1/8 sec f/8 ⌊↓⌋ 11	1/30 sec f/5.6 ⌊↓⌋ 8	1/8 sec f/11 ⌊↓⌋ 16
KODACOLOR II*	Color Prints	1/8 sec f/2.8 or 1/15 sec f/2	1/8 sec f/2.8	1/8 sec f/2.8 or 1/15 sec f/2	1/8 sec f/2.8
KODACHROME 64 (Daylight)* EKTACHROME 64 (Daylight)*	Color Slides				
EKTACHROME 200 (Daylight)*—with Normal Processing, ISO 200/ASA 200	Color Slides	1/30 sec f/2.8	1/8 sec f/5.6	1/30 sec f/2.8	1/8 sec f/5.6
KODACOLOR 400	Color Prints	1/30 sec f/4	1/8 sec f/8	1/30 sec f/4	1/8 sec f/8
EKTACHROME 200 (Daylight)*—with ESP-1 Processing for a Speed of ISO 400/ASA 400†	Color Slides				
EKTACHROME 400 (Daylight)*—with Normal Processing, ISO 400/ASA 400					
EKTACHROME 400 (Daylight)*—with ESP-1 Processing for a Speed of ISO 800/ASA 800†	Color Slides	1/30 sec f/5.6	1/8 sec f/11	1/30 sec f/5.6	1/8 sec f/11

IMPORTANT: With leaf shutters, use a shutter speed of 1/30 second or slower. With focal-plane shutters, use a shutter speed of 1/8 second or slower to avoid dark bands in your pictures. With shutter speeds slower than 1/30 second, use a tripod or other camera support. See discussion on page 4.

NOTE: The symbol ⌊↓⌋ indicates the lens opening halfway between the two *f*-numbers.

*Pictures of color television taken without a filter will look somewhat blue-green. With the color films in the table, you can use a KODAK Color Compensating Filter, CC40R, over your camera lens to help bring out the reds in your pictures. Increase the exposure suggested in the table by 1 stop. The use of the CC40R filter is not recommended for KODACOLOR 400 Film. With this film you don't need a filter.

†Use the KODAK Special Processing Envelope, ESP-1, sold by photo dealers.

The camera settings in the table were derived from practical picture tests. These exposures are good starting points, but exposure can vary because the brightness of TV images varies with individual differences in the way the TV controls are adjusted, age of the TV set, and differences in make or model. In addition, improvements are continually being made in the picture tubes for color television. To be sure of getting a properly exposed picture of an especially important subject, you may want to bracket your exposure. Take one picture at the suggested exposure, one using 1 stop more exposure, and another using 1 stop less than the suggested exposure. Remember not to use shutter speeds higher than those recommended on page 4.

A Handy Exposure Check

Some television stations broadcast a test pattern for a time before the regular programs start at the beginning of the day, or at the end of the broadcast day. A test pattern provides an unchanging image that's useful for checking your camera focus and exposure. You can make a series of test exposures ½ stop apart, with the estimated exposure as the middle of the series. Keep records of the exposures you use. Then select the best exposure for taking your TV pictures.

You can also use a regular program for checking camera focus and exposure. A program in which the scene doesn't change very often, such as a news commentator sitting at a desk, is best for this purpose.

Simple Cameras

You can photograph black-and-white television with some simple cameras when you use KODAK TRI-X Pan Film and turn up the brightness control on your television set as much as possible without losing highlight detail. Also, turn up the contrast control to restore the contrast of the TV image, but keep the contrast slightly lower than normal. Since simple cameras usually have shutter speeds higher than 1/30 second, you may get dark bands in your pictures.

If you use a KODAK INSTAMATIC Camera that accepts 126-size film and flipflash, magicubes, or flashcubes, and if the camera does not have shutter-speed settings, insert a *used* flash into the socket on the camera. This lowers the shutter speed, helping you to get enough exposure and a more uniform picture. If you have a camera with a built-in, pull-up flash holder, such as an older KODAK INSTAMATIC Camera which takes AG-1B or AG-1 flashbulbs, pull the flash holder up into position to lower the shutter speed, *but don't use a flashbulb*.

For Kodak cameras that use 110-size film, see the discussion on page 6.

The minimum distance for taking pictures with most simple cameras is 4 or 5 feet. (See your camera manual.) This distance is all right for photographing a 22- or 23-inch screen (diagonal size) or larger. If your TV screen is smaller, you may want to use a close-up lens if you can fit one onto your camera. With 14- to 21-inch screens, try a +1 close-up lens at 30 inches from the TV screen. For 12-inch or smaller screens, try a +2 close-up lens at 17 inches from the screen. When you use these camera-to-screen distances, you can make a close-up framing device from cardboard like the one described on page 3.

Movie Cameras

To make good-quality movies of television images, you would need a special camera synchronized with the television set to record successive picture cycles on successive frames of movie film. Of course this isn't practical for the amateur moviemaker. However, you can still obtain satisfactory results with an ordinary super 8 movie camera that has an *f*/2.8 (*f*/1.9 for 8 mm cameras) or faster lens.

Operate your camera at the normal camera speed of 16 or 18 frames per second. Since your movie camera is not synchronized with the TV picture cycle, your projected movie will show a slightly uneven flicker or banding effect.

With a super 8 camera that has an *f*/2.8 or faster lens, you can make movies of color or black-and-white TV images when you use KODAK EKTACHROME 160 Movie Film (Type A) and the No. 85 camera filter. This filter is built into most super 8 cameras and some 8 mm cameras. You can also use KODAK Type G EKTACHROME 160 Movie Film for a slightly different color rendition. With this film you do not use the built-in No. 85 camera filter. If you have a conventional super 8 camera not designed for existing light, you should turn up the TV brightness control as high as you can without losing too much detail. Adjust the contrast control to restore the contrast so that it appears slightly lower than normal. With a camera that has manually adjustable lens openings, set the lens at *f*/1.9 if possible. If the maximum lens opening on your camera is smaller than *f*/1.9, you can make movies at the maximum opening, but your movies will be somewhat dark.

With cameras designed for existing light, such as the KODAK XL, "Our Gang," and EKTASOUND Movie Cameras, you can take movies of television images with the TV set adjusted normally. (See page 2.) With KODAK XL and EKTASOUND Movie Cameras you can obtain better sharpness and exposure when you use KODACHROME 40 Movie Film (Type A) with the built-in camera filter rather than a faster film. The speed of this film is just right for photographing TV images with these cameras. Don't use this film with the "Our Gang" Movie Camera. The flicker or banding effect in movies made of television images is less noticeable with these cameras and other super 8 cameras which feature large shutter openings for existing-light moviemaking.

You can also use higher-speed EKTACHROME 160 Movie Film (Type A) or Type G EKTACHROME 160 Movie Film in KODAK XL and EKTASOUND Movie Cameras for photographing TV images, but it will require a little extra effort to obtain good exposure. At the minimum recommended camera-to-subject distance for these cameras, the automatic exposure control sees the dark area surrounding the TV screen and causes overexposure, or washed-out movies, on the 160 films. If you're using a KODAK "Our Gang" Movie Camera with Kodak film to photograph TV images, you should use only KODAK Type G EKTACHROME 160 Movie Film.

One way you can obtain correct exposure with the 160-speed films is to use a close-up lens so that you can position your camera close enough to the TV set for the exposure meter in the camera to make the reading of the TV image only. See the close-up lens table on page 11.

Some cameras, such as the KODAK XL342, XL352, and XL362 Movie Cameras, have a provision called an exposure-meter lock or similar device that lets you make a close-up exposure-meter reading of the TV screen. After you've made the reading, you can then move the camera back to the minimum camera-to-subject distance to film the TV image. If your camera has this feature, see your camera manual for instructions on using it.

Another way to obtain proper exposure on the 160 films with KODAK XL, "Our Gang," and EKTASOUND Movie Cameras—without using close-up lenses—is to use a neutral-density filter over the camera lens to reduce the amount of light reaching the film. A 0.40 neutral-density filter should give the correct exposure for EKTACHROME 160 Movie Film (Type A) for both color and black-and-white television. With Type G EKTACHROME 160 Movie Film, you should use a 0.50 neutral-density filter. Remember: Do not use the No. 85 camera filter with Type G film. KODAK WRATTEN Neutral Density Filters No. 96 (Gelatin Film), in 2- or 3-inch squares, are available from photo dealers. If these filters are not in stock, the dealer can order them for you.

Since the lens on your movie camera will probably be at its maximum opening, accurate focusing is necessary. Use the rangefinder if your camera has one, or measure the distance carefully from the TV screen to the film plane in your camera. You can judge where the film plane is by observing where the front edge of the super 8 cartridge is located when it's in the camera or, if you have an 8 mm camera, where the film is located behind the lens.

Your movies will be more pleasing if they show only the television screen. Depending upon your camera and the size of your TV screen, you may have to use a close-up lens in order to fill the movie frame on your film with the TV screen. With fixed-focus movie cameras, such as the KODAK XL320, XL330, "Our Gang," and EKTASOUND 230 Movie Cameras, used at the recommended minimum camera-to-subject distance (8 feet for these specific cameras), you won't be able to fill the movie frame even with the largest available home TV screen. You'll have to use close-up lenses with these cameras to get a large enough image size.

With movie cameras that have zoom lenses—such as the KODAK XL342, XL352, and XL362, and EKTASOUND 240, 250, and 260 Movie Cameras—you can probably fill the movie frame with the TV screen at the minimum recommended camera-to-subject distance (6 feet for these cameras) without using close-up lenses, unless your TV screen is very small. To do this, adjust the zoom control to fill the viewfinder and then center the TV image. If the viewfinder is separate from the lens as it is on KODAK XL, "Our Gang," and EKTASOUND Movie Cameras, you may need to move the camera lens slightly in the direction of the viewfinder. This centers the TV image on your film.

If you are using an EKTASOUND 240, 250, or 260 Movie Camera, this adjustment is not necessary. These cameras have automatic parallax correction. When you focus the camera lens, the viewfinder is automatically adjusted to compensate for subject positioning on the film due to the separation between the viewfinder and the camera lens. While this feature is most helpful at close distances within the camera's focusing range, it doesn't work when you attach a close-up lens to the camera.

CLOSE-UP LENS TABLE FOR *KODAK* MOVIE CAMERAS

KODAK Movie Cameras	TV Screen Size—Picture Diagonal (inches)	Close-Up Lens	Distance from Lens to TV Screen (inches)	Set the Camera Focus Scale at (feet)	Camera Zoom Control
XL320, XL330, XL10, XL33, and "Our Gang"* EKTASOUND 130 and 230*	14 to 25	+1	31½	Fixed-Focus	None
	11—12	+2	17½		
	9	+3	12⅛		
XL342, XL352, XL362, XL340, XL350, XL360, and XL55† EKTASOUND 240, 250, 260, 140, 150, and 160†	22—23—25	+1	39⅜	INF	Full Wide-Angle
	20—21	+1	34¾	25	
	18—19	+1	30⅞	12	
	14—15—16	+1	25⅜	6	
	11—12	+2	19⅝	INF	
	9	+2	15½	6	Intermediate Position

*In some situations with a fixed-focus camera, the TV image size may be slightly larger than the movie frame size on your film. The edges of the TV screen may be cut off in your movies, but this is usually better than too small an image.

†If necessary, use intermediate positions of the camera zoom control for more nearly precise framing.

In the preceding table, close-up lenses are also recommended for cameras with zoom lenses to help obtain proper exposure. This lets you position the camera close to the TV screen so that the camera exposure meter measures only the TV image.

When you're using a close-up lens on your camera, measure the distance from the TV screen to the front rim of the close-up lens.

If the viewfinder on your camera is separate from the camera lens and you're using a close-up lens, use a close-up framing device to center the TV image on your film as described on page 3. For information on obtaining close-up lenses and adapters, see page 2.

If you have an 8 mm camera, you must have an *f*/1.9 or faster lens to photograph television images. You can make recognizable, though dark, movies of color or black-and-white TV images when you use KODACHROME 25 Movie Film (Daylight), or KODACHROME 40 Movie Film (Type A) with a No. 85 filter. When using these films, turn up the brightness and contrast controls on your television set for maximum brightness without losing too much detail, as described earlier. If your camera has manually adjustable lens openings, set the lens at its largest opening.

You can obtain brighter movies of *black-and-white television images* by using the Type A color film without a No. 85 filter. The black-and-white images in your movies will be somewhat bluish but will certainly be acceptable. Your camera manual will tell you how to move the No. 85 filter out of the light path in your camera. However, with movie cameras designed for existing light, *you should use the filter*. There is plenty of light from the TV screen for proper exposure when you use an existing-light camera, and the No. 85 filter helps to make the black-and-white image appear neutral on your film.

Sound Movies

You can make sound movies of television programs with a movie camera that records sound, such as the Kodak Ektasound Movie Cameras. To make sound movies with your camera, you'll need sound movie film. For a super 8 sound movie camera, you can use either Kodachrome 40 Sound Movie Film (Type A) or Kodak Ektachrome 160 Sound Movie Film (Type A). Plug the microphone into the camera or microphone jack according to the instructions for your equipment. Point the mike toward the TV speaker and keep the mike at least 6 feet from the TV set so that you don't have an audible hum recorded on your sound track. If you're using an on-camera microphone, the mike will be pointed toward the TV set. When you're using a camera with this feature closer than 6 feet from the television set, use a separate microphone to keep the mike 6 feet or more from the set.

To minimize the possibility of recording extraneous noise or other unwanted sounds, set the volume control on your TV set slightly higher than normal. Then follow the procedures already described to photograph TV images, and you're all set for making sound movies of TV programs.

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MORE INFORMATION

If you have questions not answered by this publication, write to Eastman Kodak Company, Photo Information, Department 841, Rochester, New York 14650.

Kodak offers a number of photo books and guides that can help you improve your picture-taking skills. Among them are *Adventures in Existing-Light Photography* (AC-44), $3; *KODAK Films—Color and Black-and-White* (AF-1), $3.95; *The Joy of Photography* (AC-75S), $11.95 (softcover); (AC-75H), $19.95 (hardcover); and the *KODAK Master Photoguide* (AR-21), $5.75. See your photo dealer.

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